

Appl. No. 10/761,702

Examiner: Warren, Matthew E, Art Unit 2815

In response to the Office Action dated March 10, 2005

Date: July 11, 2005

Attorney Docket No. 10113671

## REMARKS

Applicant thanks the Examiner for acknowledging Applicant's claim to foreign priority and receipt of the certified copy of the priority document. Responsive to the Office Action mailed on March 10, 2005 in the above-referenced application, Applicant respectfully requests amendment of the above-identified application in the manner identified above and that the patent be granted in view of the arguments presented. No new matter has been added by this amendment.

### Present Status of Application

Claims 1-9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art Figure 3E (hereinafter "APAF") in view of Maex et al (U. S. Patent 6,323,555). Claims 10-24 are withdrawn from consideration.

In this paper, claim 1 is amended to recited that the transistor has a raised gate electrode. Furthermore, claim 1 is amended to recite that the composite dielectric layer is formed directly on the transistor. Support for these amendments can be found in page 6, lines 21 to page 8, line 16, Fig.6A and Fig. 6B of the application. New claims 25-27 are added, where new claim 25 recites that the first dielectric layer comprises polysilsequioxane, new claim 26 recites that the first dielectric layer comprises polyimide, and new claim 27 recites that the first dielectric layer comprises fluorinated polyimide. Support for new claims 25-27 can be found in original claim 2. Claim 2 is canceled. Withdrawn claims 10-24 are canceled in favor of a divisional application directed thereto. The summary is amended to correspond with the claims as amended. Thus, on entry of this amendment, claims 1, 3-9 and 25-27 remain in the application.

Reconsideration of this application is respectfully requested in light of the amendments and the remarks contained below.

### Rejections Under 35 U.S.C. 103(a)

Claims 1-9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over APAF in view of Maex et al. To the extent that the grounds of the rejections may be applied to the claims now pending in this application, they are respectfully traversed.

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APAF shows a conventional bit line contact structure in which a boro-phosphosilicate glass (hereinafter "BPSG") layer is formed on a transistor with a raised gate electrode as a pre-metal dielectric (hereinafter "PMD") layer. As noted in the description of APAF, the hole-filling capability of BPSG is insufficient to prevent voids in the PMD layer. See page 2, lines 2-5 of the present application.

Maex et al teach a metallization structure formed on a fluorine-containing dielectric. As shown in Figs. 1C-1H of Maex et al, a first fluorine-containing dielectric layer 2 is formed on a flattened substrate, i.e., a silicon wafer 1. See column 6, lines 33-34 of Maex et al. Subsequently, a hard mask layer 3, e.g., a silicon nitride layer, is formed on the first fluorine-containing dielectric layer, and a second fluorine-containing dielectric layer 5 is formed over the hard mask layer.

The office action fails to establish a *prima facie* case of obviousness in that it does not establish suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings.

MPEP 2142 reads in part:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In connection with the first criteria, courts have held:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)

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On page 3 of the office action, the suggestion or motivation for combining APAF with Maex et al is stated as follows:

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the dielectric layer of the APAF by forming a composite layer as taught by Maex to provide a semiconductor device having a low-K dielectric ***with improved gap filling and planarization.*** [Emphasis added]

As noted above, APAF teaches the use of a single BPSG layer formed on a transistor with a raised gate electrode as a PMD layer, which leads to the problem of voids. One object of the invention is to avoid bit line-bit line short caused by the voids in the PMD layer when the width of exposed drain region between two neighboring raised gate electrodes reaches approximately 0.040  $\mu\text{m}$  as the design rule is reduced to about 0.070  $\mu\text{m}$  to 0.090  $\mu\text{m}$ . See page 2, lines 22-25 and page 3, lines 9-12 of the application and Figs. 3A and 6A of the application. There is no suggestion of the use of a composite dielectric layer to solve this problem in APAF.

Maex et al, teaches the formation of a composite structure comprising a first fluorine-containing dielectric layer 2, a hard mask layer 3, and a second fluorine-containing dielectric layer on a flattened substrate 1. Applicant notes that Maex et al teach that low-K organic materials comprising fluorine feature "excellent gap-fill and planarization." See column 2, lines 1-3 of Maex et al. However, this teaching does not address the desirability the ***composite structure*** taught therein in connection with gap-fill. This is simply not an issue in Maex et al because the composite structure is formed on a ***flattened substrate***.

In this regard, the Examiner is reminded that the prior art and claimed invention must be taken ***as a whole***. Namely, the question under 35 U.S.C. 103 is whether the claimed invention as a whole would have been obvious. MPEP 2141.02; *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983).

Given that the composite structure of the first fluorine-containing dielectric layer, hard mask layer, and second fluorine-containing dielectric layer of Maex et al is formed on a flattened

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substrate, for which voids and gap-fill are not an issue, Applicant submits that Maex et al contains no suggestion of the use of a composite structure for "improved gap filling and planarization," as indicated in the office action.

As there is no suggestion or motivation in either reference cited by the Examiner to modify APAF to include the composite structure described in Maex et al, Applicant submits that the first criteria for establishing a *prima facie* case of obviousness has not been met.

Furthermore, in *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780 (Fed. Cir. 1992), the Federal Circuit stated:

It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior so that the claimed invention is rendered obvious. *In re Gorman*, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991). This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." (quoting *In re Fine*, 837 F.2d at 1075, 5 USPQ2d at 1600).

It is the Applicant's belief that the present rejection fits the Federal Circuit's description of an impermissible rejection under §103(a). The office action simply states certain elements of the present invention and then locates isolated disclosures of those components in APAF and Maex et al without pointing to anything in the prior art that suggests the desirability of the combination. Indeed, the only statement of the ***desirability of the composite dielectric layer formed on a transistor with a raised gate*** as recited in claim 1 comes from Applicant's own disclosure.

For at least these reasons, Applicant submits that the rejections of the claims 1 and 3-9 should be withdrawn.

#### New Claims 25-27

Applicant submits that claims 25-27 are allowable for the same reasons described in connection with claims 1 and 3-9. Applicant further submits that neither APAF nor Maex et al., whether taken alone or in combination, teach or suggest a composite dielectric layer, sequentially having

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a first dielectric layer, barrier layer, and second dielectric layer, directly on the transistor, wherein the first dielectric layer comprises polysilsequioxane, as recited in new claim 25.

For at least these reasons, it Applicant's belief that claims 25-27 are allowable over the cited references.

#### Spin-Coating Material

The Examiner asserts that the "spin-coating" limitation of the claims is a "product by process" limitation. Those skilled in the art know that the terms "spin-coating material" or "spin-on material" limit the properties of the materials as well as the process for forming a layer. For example, the BPSG in APAF cannot be "spin-coating" material, as is well known by those skilled in the art.

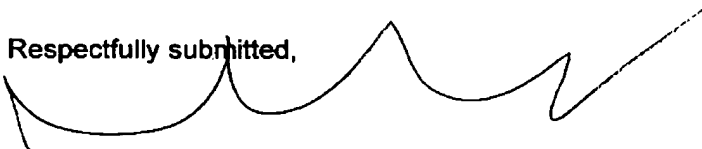
#### Information Disclosure Statement

Applicant notes that an information disclosure statement was filed on March 7, 2005. Applicant respectfully requests that the Examiner indicate that he has considered the information disclosed by the statement by returning a copy of the Form PTO-1449 submitted therewith with his initials or other appropriate mark beside each listed reference.

#### Conclusion

The Applicant believes that the application is now in condition for allowance and respectfully requests so.

Respectfully submitted,



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